ELSEVIER

Cement and Concrete Composites 21 (1999) iii–iv

Cement & Concrete Composites

Editorial

This particular issue of the journal devoted to portland–limestone cements was planned for publication almost eighteen months ago — long before this topic and material have come to some degree of prominence in certain parts of the world. Unfortunately for a variety of reasons the publication got delayed, but this is the final result.

The subject matter of this Special Issue is of particular interest to the Editor and for research on concrete at Sheffield. The Concrete Research Group at the University of Sheffield is unique in some respects. It has pioneered research in the four major deterioration processes that have affected the durability of concrete, and created much debate, argument and clashes of views amongst the international community. These research activities relate to the use of high alumina cement, alkali–aggregate reactivity, delayed ettringite formation, and more recently, on the 'new' form of sulfate attack, namely, that of thaumasite formation in concretes containing limestone aggregates and/or fines. A significant emphasis of the research at Sheffield is to interrelate microstructural and micromechanical phenomena with the behaviour of full-scale structural elements and *in-situ* field performance.

Laboratory research, by itself, has limited value, if the results of such studies are not communicated widely to the relevant industry and practising engineers. This is where this journal comes in. The journal promotes specially edited theme issues devoted to particular research areas which have become topical and timely, and information on which is scattered and is not readily available or accessible. Being involved in similar research gives an added motivation and interest to disseminate results of studies that are crucial to our understanding of the problems and phenomena involved, and to develop cost-effective and durable solutions. Thus, recent issues of the journal have, for example, focused on Alkali Aggregate Reactions featured in Vol. 19, Nos 5&6, 1997, on Delayed Ettringite Formation in Vol. 18, No. 3, 1996 and in the Kobe Earthquake featured in Vol. 19, No. 3, 1997.

Limestone-filled cements are not new to Europe. In 1990, for example, 67 brands of composite cements existed in France — of these, 61 brands contained limestone filler alone, or more often, with other secondary constituents. Twenty-nine of these had filler contents between 15 and 25% by mass of cement. Part of this development is due to the fact that limestone is available abundantly in France, and cement plants are often built close to limestone quarries. The practice of intergrinding limestone with clinker then becomes attractive, economically and technically.

Much of the impetus for the use of portland–limestone cements also came from the belief that concrete strength is a major factor determining the performance of concretes. Experience had also shown that filler cements which were able to meet the requirements of the appropriate strength classes performed as well as traditional cement concretes. The general feeling has been that, strength being the controlling factor, portland–limestone cements that satisfied the appropriate specifications also possessed adequate durability for many applications. Excepting severely aggressive environments, blends of portland cement with limestone fillers, within specific limits of blending, were thus considered to offer improved concretes with similar strength and durability qualities as conventional concretes.

Experience tells us that deterioration processes involving the chemistry and microstructure of concrete are often unpredictable, and unusual. The factors involved in such mechanisms are too complex, very interdependent and highly interactive. Simplistic models belie the complex nature of the reactivity, but the problems are not intractable. External agents, environmental conditions and microclimates can have as much devastating effect as the basic ingredients of the reaction. What is important is that engineers should not allow themselves to be overwhelmed or blinded either by field occurrences or by laboratory findings of a microstructural level.

There are nine papers included in this volume dealing with the development of portland–limestone cement and limestone aggregate concretes, the role of limestone filler in cement hydration, engineering and durability properties of portland–limestone cement

concretes, the formation, identification and performance of thaumasite in concrete, the deterioration of historic buildings due to thaumasite formation, and the repair of structures damaged by thaumasite formation. It is hoped that these papers will give some insight into the role of limestone aggregates and limestone fillers on the properties and durability of concretes incorporating them when they are exposed to sulfate attack. The Editor would like to extend his thanks to all the authors for their efforts in the preparation of their papers, and apologises for the delay in the final publication of this special issue.